

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number:

**0 179 510
B1**

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: 26.10.88

(51) Int. Cl.⁴: C 08 L 57/02, C 08 L 45/02

(21) Application number: 85201543.7

(22) Date of filing: 25.09.85

(54) A binder composition which is pigmentable.

(30) Priority: 15.10.84 GB 8426007

(43) Date of publication of application:
30.04.86 Bulletin 86/18

(45) Publication of the grant of the patent:
26.10.88 Bulletin 88/43

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI NL SE

(56) References cited:
GB-A-1 274 326

(73) Proprietor: SHELL INTERNATIONALE
RESEARCH MAATSCHAPPIJ B.V.
Carel van Bylandtlaan 30
NL-2596 HR Den Haag (NL)

(72) Inventor: Syrier, Johannes Leopold Marie
Badhuisweg 3
NL-1031 CM Amsterdam (NL)
Inventor: Vonk, Willem Cornelis
Badhuisweg 3
NL-1031 CM Amsterdam (NL)
Inventor: Van Gooswilligen, Gerrit
Badhuisweg 3
NL-1031 CM Amsterdam (NL)

(74) Representative: Aalbers, Onno et al
P.O. Box 302
NL-2501 CH The Hague (NL)

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Description

- This invention relates to a binder composition which is pigmentable comprising a mineral lubricating oil extract and a petroleum resin and/or coumarone-indene resin.
- Such binder compositions are already known from British Patent Specification 1,226,234. These compositions moreover contain a class of block copolymers of the styrene/conjugated diene type. These binder compositions are light-coloured and therefore pigmentable, so that the ultimate mineral aggregate-, filler- and pigment-containing asphaltic compositions can e.g. be used for marking purposes by means of coloured overlays over asphaltic concrete base courses of roads.
- It has now been found that the above known binder compositions can be improved as to the ductility and adhesion properties towards mineral aggregates by using a special class of resins. The invention therefore relates to the above binder compositions wherein the petroleum resin and/or the coumarone-indene resin contains carboxylic acid, carboxylic acid anhydride or hydroxyl groups. These resins will hereinafter be indicated by the expression "modified resins".
- The present binder compositions can also be used e.g. for industrial purposes, such as in the building industry, e.g. for roofing or sealing, for pipe coatings and for hydraulic purposes. Suitable extracts are obtained by solvent-extraction of a mineral lubricating oil in particular of a Bright-Stock, being a lubricating oil, derived from deasphalted oil. Suitable solvents are e.g. phenol, N-methyl pyrrolidone, liquid sulphur dioxide, either alone or in combination with an aromatic compound such as benzene, and in particular furfural. These extracts may be used in proportions of 30—99 %w, preferably 60—95 %w, based on the binder. Petroleum resins may be prepared by polymerization of unsaturated hydrocarbons present in unsaturated petroleum fractions, such as thermally cracked fractions and unsaturated hydrocarbons obtained in the pyrolysis of hydrocarbons.
- Coumarone-indene resins may be prepared by polymerization of unsaturated hydrocarbons present in coal tar distillates. The present modified resins may e.g. be obtained by treating the above resins with unsaturated carboxylic acids or anhydrides, in particular maleic anhydride, or by mild oxidation. They may also be obtained by modification of the preparation process of the resins, e.g. by polymerization of the unsaturated hydrocarbons in the presence of unsaturated carboxylic acids or anhydrides, in particular maleic anhydride, or in the presence of hydroxyl group containing unsaturated carboxylic acids or esters thereof, such as hydroxyethylmethacrylate. The modified resins may have acid values of e.g. 1—100, preferably 5—50 mg KOH/g. The present modified resins may suitably be used in proportions of 1—70 %w, preferably 5—40 %w, based on the binder.
- Of course mixtures of extracts and/or mixtures of modified resins optionally together with the unmodified resins or other resins can be used. The extracts and/or resins may partially or wholly be blown before or after blending. Normally blowing of the extract reduces the amount of resin required.
- Compared with blown mixtures of extracts and unmodified resins blown mixtures of extracts and the present modified resins show improved adhesive properties. The present binder compositions may be used as cutbacks or together with a flux oil. Proportions of 30—60 %w of volatile organic solvent or flux oil may e.g. be used.
- The ultimate asphaltic compositions in which the present pigmentable binders may be used, usually contain mineral aggregates and fillers, each in proportions of e.g. 5—98 %w, preferably 20—95 %w, based on the asphaltic compositions. Suitable mineral aggregates are stone chips, gravel, slag and sand. Suitable fillers are mineral dusts, ground chalk, ground limestone and talc.
- The present pigmentable binders may be present in proportions of e.g. 1—15 %w, preferably 4—8 %w, based on the asphaltic composition. Pigments may be used in proportions of 0—10 %w, preferably 0.05—2 %w, based on the asphaltic composition.
- Suitable pigments are e.g. red and yellow iron oxides, titanium oxide (white), chromex green, cobalt blue, etc.
- The present binder compositions may also contain minor proportions, such as 0—30 %w, e.g. 0.5—10 %w, based on the binder of other ingredients, such as blown or unblown bitumen, e.g. propane bitumen; natural or synthetic rubbers, e.g. optionally hydrogenated, linear or branched, e.g. star-shaped, block copolymers of styrene and a conjugated diene (e.g. butadiene or isoprene); waxes, such as paraffin waxes; polymers such as polyethylene, polypropene and poly(iso)butene; tackifiers, such as Li salts of C₁₀₋₄₀ (hydroxy) fatty acids, e.g. Li (hydroxy) stearate to render the present compositions self-adhesive. Preferably the composition contains a synthetic rubber, as defined above, and/or a Li salt of a C₁₀₋₄₀ fatty acid or of a C₁₀₋₄₀ hydroxy fatty acid.

Example 1

A Bright-Stock furfural extract (BFE) was mixed with the following resins:

A: unmodified coumarone-indene resin,

B: commercial modified petroleum resin containing carboxylic acid groups (acid value 19 mg KOH/g),

5 C: experimental modified petroleum resin containing carboxylic acid groups (acid value 9.2 mg KOH/g).

Modified resins B and C are both prepared by polymerization of unsaturated hydrocarbons in the presence of maleic anhydride.

The resins were stirred with the extract at 200—220°C during about 30 minutes.

10 The obtained mixtures were tested and the results are indicated in Table A (compositions in %w).

TABLE A

Composition	1	2	3	4
15 BFE	70	68	70.5	67
Resin A	30	24	29	—
20 Resin B	—	8	—	—
Resin C	—	—	—	33
Maleic anhydride	—	—	0.5	—
25 Properties:				
Penetration at 25°C, 0.1 mm (ASTM D 5)	88	88	79	81
30 Softening point, ring and ball, °C (ASTM D 36)	43.5	46	45	46
Ductility at 10°C, cm (ASTM D 113)	14	>80	10	>60
35 Marshall stability, N ¹	7350	7860	7180	7330
Marshall stability after 14 days at 60°C under water, N ¹	0	6850	6500	6780
40 Retained stability, %	0	87	90	92

¹ASTM D 1559, at 60°C, dense asphaltic concrete, 5.8% binder, about 5% voids.

45 This Table shows the excellent overall properties of the compositions according to the present invention (compositions 2 and 4) and the much improved ductility properties of the present compositions 2 and 4 compared with compositions 1 and 3 containing unmodified resin.

50 Example 2

The following components were mixed to obtain a joint sealing composition (%w):

40.5 blend of BFE and carboxylated petroleum resin, weight ratio 75:25, PEN (25°C, 0.1 mm) 200

36.3 limestone filler

55 4.7 lithium stearate

1.7 branched styrene/butadiene/styrene block copolymer, having a styrene content of 30 %w

1.0 dioleate of oleyl aminopropylene diamine

13.8 dichloromethane

2.0 pigment

60 The properties, after evaporation of solvent, are indicated in Table B.

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TABLE B

PEN (25°C, 0.1 mm)	44
Dropping point, °C (IP 132/65):	191
Flow 1.5 mm, 14 days, vertical, 90°C:	none

Good wet tack properties on concrete, wood, glass and aluminium.

Example 3

The following components were mixed to obtain a roofing composition (%w):

- 77.7 blend of 91 %w mixture of BFE and carboxylated petroleum resin (weight ratio 75.4:24.6) and 9 %w hydrogenated linear styrene/butadiene/styrene block copolymer, having a styrene content of 33 %w
- 15.5 limestone filler
- 3.9 TiO₂
- 2.9 pigment

The properties are indicated in Table C.

TABLE C

Softening point R & B (°C)	121
Penetration 25°C (0.1 mm)	46
Viscosity 180°C (mPas)	9630
200°C	3910
220°C	1630
Cold bend (φ 30 mm, 5 s) (DIN 52123)	
pass (°C)	-10
fail (°C)	-15
Flow resistance (2 h) (DIN 52123)	
pass (°C)	110
fail (°C)	115
Tensile test (ASTM D 2523-66T/D 412, ASTM 1708/70)	
Yield stress (10 ⁵ N/m ²)	3.5
Modulus 300%	4.0
Modulus 500%	6.2
Maximum stress	14.3
Elongation at max. stress (%)	980.
Stress at break (10 ⁵ N/m ²)	13.7
Elongation at break (%)	1000

Claims

1. A binder composition which is pigmentable comprising a mineral lubricating oil extract and a petroleum resin and/or coumarone-indene resin, characterized in that the petroleum resin and/or the coumarone-indene resin contains carboxylic acid, carboxylic acid anhydride or hydroxyl groups (modified resin).
2. A composition as claimed in claim 1, wherein the extract is a Bright-Stock furfural extract.
3. A composition as claimed in claim 1 or 2, wherein the proportion of the extract is 30—99 %w and of the modified resin 70—1 %w.
4. A composition as claimed in claim 3, wherein the proportion of the extract is 60—95 %w and of the modified resin 40—5 %w.
5. A composition as claimed in any one of claims 1—4, wherein the modified resin is obtained by treating the resin with maleic anhydride.
6. A composition as claimed in any one of claims 1—4, wherein the modified resin is obtained by polymerization of the unsaturated hydrocarbons from which the resins are prepared in the presence of maleic anhydride.
7. A composition as claimed in any one of claims 1—6, wherein the extract and/or the resin is blown.

8. A composition as claimed in any one of claims 1—7, wherein additionally a pigment and/or mineral aggregates and/or fillers are present.

9. A composition as claimed in any one of claims 1—8, wherein additionally a minor proportion of a synthetic rubber and/or a Li salt of a C₁₀₋₄₀ (hydroxy) fatty acid is present.

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Patentansprüche

1. Pigmentierbare Bindemittelzusammensetzung mit einem Gehalt an einem Mineralschmierölextrakt und einem Erdölharz und/oder Cumaron-Inden-Harz, dadurch gekennzeichnet, daß das Erdölharz und/oder
10 Cumaron-Inden-Harz Carbonsäure-, Carbonsäureanhydrid- oder Hydroxylgruppen enthält (modifiziertes Harz).

2. Zusammensetzung nach Anspruch 1, worin der Extrakt ein Bright-Stock Furforolextrakt ist.

3. Zusammensetzung nach Anspruch 1 oder 2, worin der Extraktanteil 30 bis 99 Gew.% und der Anteil an modifiziertem Harz 70 bis 1 Gew.-% beträgt.

15 4. Zusammensetzung nach Anspruch 3, worin der Extraktanteil 60 bis 95 Gew.-% und der Anteil an modifiziertem Harz 40 bis 5 Gew.-% beträgt.

5. Zusammensetzung nach einem der Ansprüche 1 bis 4, worin das modifizierte Harz durch Behandeln des Harzes mit Maleinsäureanhydrid erhalten wird.

20 6. Zusammensetzung nach einem der Ansprüche 1 bis 4, worin das modifizierte Harz durch Polymerisation der ungesättigten Kohlenwasserstoffe, aus denen die Harze hergestellt werden, in Gegenwart von Maleinsäureanhydrid erhalten wird.

7. Zusammensetzung nach einem der Ansprüche 1 bis 6, worin der Extrakt und/oder das Harz geblasen wird.

25 8. Zusammensetzung nach einem der Ansprüche 1 bis 7, worin zusätzlich ein Pigment und/oder Mineralaggregate und/oder Füllstoffe vorliegen.

9. Zusammensetzung nach einem der Ansprüche 1 bis 8, worin zusätzlich ein kleiner Anteil eines synthetischen Gummis und/oder eines Lithiumsalzes einer C₁₀₋₄₀(Hydroxy)fettsäure vorliegt.

Revendications

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1. Une composition de liant pigmentable comprenant un extrait d'huile lubrifiante minérale et une résine de pétrole et/ou une résine coumarone-indène, caractérisée en ce que la résine de pétrole et/ou la résine coumarone-indène contiennent des groupes acide carboxylique, anhydride d'acide carboxylique ou hydroxyle (résine modifiée).

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2. Une composition selon la revendication 1, dans laquelle l'extrait est un extrait au furfural de bright stock.

3. Une composition selon la revendication 1 ou 2, dans laquelle la proportion de l'extrait est de 30—99% en poids et celle de la résine modifiée est de 70—1% en poids.

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4. Une composition selon la revendication 3, dans laquelle la proportion de l'extrait est de 60—95% en poids et celle de la résine modifiée est de 40—5% en poids.

5. Une composition selon l'une quelconque des revendications 1—4, dans laquelle la résine modifiée est obtenue en traitant la résine par l'anhydride maléique.

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6. Une composition selon l'une quelconque des revendications 1—4, dans laquelle la résine modifiée est obtenue par polymérisation des hydrocarbures insaturés à partir desquels les résines sont préparées en présence d'anhydride maléique.

7. Une composition selon l'une quelconque des revendications 1—6, dans laquelle l'extrait et/ou la résine sont soufflés.

8. Une composition selon l'une quelconque des revendications 1—7, dans laquelle en outre un pigment et/ou des agrégats minéraux et/ou des fillers sont présents.

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9. Une composition selon l'une quelconque des revendications 1—8, dans laquelle en outre une proportion mineure d'un caoutchouc synthétique et/ou d'un sel de Li d'un (hydroxy) acide gras en C₁₀₋₄₀ est présente.

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